I. Solution by Professor E. W. MORRELL, Department of Mathematics, Montpelier Seminary, Montpelier, Vermont; and BENJ. F. YANNEY, A. M., Professor of Mathematics, Mount Union College, Alliance, Ohio.

The formula for P dollars at compound interest for n years payable q times a year at rate r, is $P(1+\frac{r}{q})^{qn}$. In this case q is infinity; let $\frac{r}{q}=\frac{1}{x}$, whence $q=rx$ and the formula becomes $P(1+\frac{1}{x})^{xnr}$, but $(1+\frac{1}{x})^x=e$ at the limit and we have the amount$=Pe^{nr}$ and the interest will be $Pe^{nr}-P$. In this case $P=500$, $e=2.718281828$, $n=10$, $r=.10$, and we have the interest$=500(2.718281828-1)=\$859.1409142$.

II. Solution by W. H. CARTER, Professor of Mathematics, Centenary College of Louisiana, Jackson, Louisiana; and JOHN M. ARNOLD, Crompton, Rhode Island.

$\frac{A}{P}=(1+\frac{r}{q})^{qn}=\frac{A}{500}=(1+\frac{1}{10q})^{10q}$. Expanding the second member, and reducing, $\frac{A}{500}=1+1+\frac{(1-\frac{1}{10q})}{2!}+\frac{(1-\frac{1}{10q})(1-\frac{2}{10q})}{3!}+\ldots\ldots\ldots\ldots$

When the intervals are infinitely small the number of intervals (q) is infinitely large, and the fraction in each factor of the numerator of each term is zero. $\therefore \frac{A}{500}=1+1+\frac{1}{2!}+\frac{1}{3!}+\ldots\ldots\ldots\ldots$

The sum of this series is the Naperian base. $\therefore \frac{A}{500}=2.718281828$. $\therefore A=1359.140914$, and $A-P=\$859.140914$=interest required.

III. Solution by Professor J. SCHEFFER, Hagerstown, Maryland.

Let y be the amount, a the initial principal, r the rate per cent., and t the time in years; then, we have from $dy=\frac{rydt}{100}$, $y=Ce^{\frac{rt}{100}}$, but since for $t=0$, $y=a$, we have $C=a$. $\therefore y=ae^{\frac{rt}{100}}$, and interest$=a(e^{\frac{rt}{100}}-1)$. For $r=10$, $t=10$, we have interest$=500(e-1)=500\times1.718281828=\$859.140914$.

Also solved by *O. W. ANTHONY, P. S. BERG, F. P. MATZ, C. D. SCHMITT, H. C. WILKES.* and *G. B. M. ZERR.*

49. Proposed by P. S. BERG, Larimore, North Dakota.

A man having lent \$6000 at 6 per cent. interest *payable quarterly*, wishes to receive his interest in *equal* proportions monthly, and in *advance.* How much ought he to receive monthly?

Let $\$x$=the sum he should receive monthly. But $6000\times.015=\$90=$ quarterly interest. $\therefore\ 1.015x+1.01x+1.005x=\$90$. $\therefore\ 3.03x=\$90$. $x=\$29.70297+$.

Also solved by *P. S. BERG, F. P. MATZ, J. SCHEFFER*, and *G. B. M. ZERR*.

NOTE.—Solutions of Nos. 46 and 47, Algebra, were received too late for selection from Prof. Benj. F. Yanney, A. M., Mount Union College, Alliance, Ohio.

PROBLEMS.

56. Proposed by D. G. DORRANCE, Jr., Camden, Oneida County, New York.

Sum the series 1, 1, 1, 2, 3, 4, 6, 9, 13, 19, etc., to n terms; also what is the n^{th} term ?

57. Proposed by DAVID EUGENE SMITH, Ph. D., Professor of Mathematics, Michigan State Normal School, Ypsilanti, Michigan.

Prove that the product of the n n^{th} roots of 1 is $+1$ or -1 according as n is odd or even. Prove, and generalize, for the n n^{th} roots of m.

58. Proposed by ROBERT JUDSON ALEY, M. A., Associate Professor of Mathematics, Leland Stanford Jr. University, Palo Alto, California.

Telegraph poles are a yards apart; for how many minutes must one count poles in order that the number of poles counted may be equal to the number of miles per hour that the train is running ?

Solutions of these Problems should be received on or before January 1, 1896.

GEOMETRY.

Conducted by B. F. FINKEL, Springfield, Mo. All contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

45. Proposed by GEORGE E. BROCKWAY, Boston, Massachusetts.

If an equilateral triangle is inscribed in a circle, the sum of the squares of the lines joining any point in the circumference to the three vertices of the triangle is constant.

Solution by JAMES F. LAWRENCE, Breckenridge, Missouri.

Let ABC be the inscribed equilateral triangle and P any point in the circumference of the circle. Join P with the points A, B, and C.

Then $AB^2=BP^2+AP^2-2BP\times AP\cos 60^\circ$

$=BP^2+AP^2-BP\times AP$, and